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EXAMINER	
MCDOWELL, JR, MAURICE L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/593,150	Applicant(s) GUTMANN ET AL.
	Examiner MAURICE MCDOWELL, JR	Art Unit 2628

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 10/8/2010 have been fully considered but they are not persuasive.

2. Applicant argues: Kanade teaches taking a group of points from a three-dimension data. The group of data is assumed to be nearly two-dimension data and fitted to a two- dimensional staircase model 94. Kanade paragraphs [0082]-[0084]. However, when fitting the two-dimension data into model shape 94, Kanade does not teach or suggest a "changeable threshold" is used, nor does Kanade teach or suggest a "changeable threshold adapted to... noises included in the group of distance data points," as recited in claim 1.

3. Examiner respectfully disagrees: Kanade does teach or suggest a "changeable threshold adapted to... noises included in the group of distance data points," as recited in claim 1; see fig. 12 and [0069] [0071] [0072] [0074] ("…and as shown in Fig. 12, the processing regions are first selected based on the stricter threshold values and next the selected regions are expanded using the looser threshold values"); thus Kanade teaches the above limitation because the strict and loose threshold values are the same as the changeable threshold adapted to distribution of data points and noises in the data points.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanade et al. Pub. No.: US 2005/0135680 A1 in view of Leger Patent No.: 5,978,504.

6. Regarding claim 1, Kanade teaches: A plane detection apparatus for detecting planes from three-dimensional distance data, the apparatus comprising: a line fitting means for fitting a line to each group of distance data points estimated to be in one plane in a three-dimensional space (figs. 16-18 see also [0083] [0084]); the line fitting means fitting lines using a changeable threshold adapted to distribution of distance data points and noises included in the group of distance data points (fig. 12, see also [0069] [0071] [0072] [0074]) (The strict and loose threshold values are the same as a changeable threshold).

7. Kanade doesn't teach: a planar region growing means for extracting a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines

8. The analogous prior art Leger teaches: a planar region growing means for extracting a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines (fig. 1, 24 see also col. 3 lines 43-46) for the benefit of providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition (col. 1 lines 42-45).

9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine a planar region growing means for extracting a plurality of lines estimated

to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines as shown in Leger with Kanade for the benefit of providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition.

10. Regarding claim 2, Kanade teaches: The apparatus, wherein the line fitting means extracts a group of distance data points estimated to be in one plane on the basis of the distance between the distance data points, and re-estimates, based on the distribution of the distance data points in the distance data point group, whether the distance data point group exists in one plane (fig. 14, 90 see also [0089]).

11. Regarding claim 3, Kanade teaches: The apparatus, wherein the line fitting means extracts lines from a group of distance data points estimated to be in the one plane, takes, as a point of interest, a distance data point whose distance to the lines is largest in the group of distance data points, judges, when the distance is smaller than a predetermined threshold, whether the distance data points in the distance data point group are unevenly distributed, and segments the distance data point group by the point of interest when the distribution is uneven (fig. 9, 90 see also [0072]).

12. Regarding claim 4, Kanade teaches: The apparatus, wherein the line fitting means extracts a first line from the group of distance data points estimated to lie in the one plane, takes a distance data point in the group, whose distance from the first line is longest, as a point of interest, extracts a second line from the distance data point group when the distance is smaller than a predetermined threshold, judges whether a larger number of distance data points than a predetermined number exist continuously at one side of the second line, and divides the distance

data point group by the point of interest when a larger number of distance data points than the predetermined number exist continuously (fig. 11, see also [0072]).

13. Regarding claim 6, Leger further teaches: The apparatus, wherein the planar region growing means selects more than one line estimated to be in one plane and calculates a reference plane, searches lines estimated to be in the plane in which the reference plane lies as grouping lines from the group of lines, updates the reference plane with the grouping lines, repeats the grouping of the region of the reference plane, and outputs the updated plane as an updated one (col. 5 lines 10-14).

14. Regarding claim 7, Leger further teaches: The apparatus, further comprising a plane recalculating means for recalculating a plane from the group of distance data points except for ones whose distance from the updated plane is larger than a predetermined threshold, if any, existing in the distance data point group in the updated plane (col. 5 lines 14-19).

15. Regarding claim 8, Leger further teaches: The apparatus, wherein the planar region growing means estimates, based on a difference between a lines-determined plane and reference plane, whether the lines lie coplanar with the reference plane (col. 6 lines 21-25).

16. Regarding claim 9, Kanade teaches: The apparatus, wherein the line fitting means generates the second line by the least-squares method from a group of distance data points estimated to be in the one plane (fig. 18, 94 see also [0084]).

17. Regarding claim 10, Kanade teaches: The apparatus, wherein the line fitting means extracts lines on the basis of three-dimensional distance data measured by a distance measuring means which measures a distance on the basis of a parallax of two imaging means (fig. 4, 50 see also [0096]).

18. Regarding claim 11, Leger further teaches: The apparatus, wherein the line fitting means extracts lines on the basis of three-dimensional distance data measured by a laser range finder (col. 1 lines 62-65).

19. Regarding claim 12, Kanade teaches: A plane detection method of detecting planes from three-dimensional distance data, the method performed by a processor comprising the steps of: fitting, by the processor, a line to each group of distance data points estimated to be in one plane in a three-dimensional space (figs. 16-18 see also [0083] [0084]); in the line fitting step, lines being fitted using a changeable threshold adapted to distribution of distance data points and noises included in the group of distance data points (fig. 12, see also [0069] [0071] [0072] [0074]).

20. Kanade doesn't teach: extracting, by the processor, a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines to grow a planar region.

21. The analogous prior art Leger teaches: extracting, by the processor, a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines to grow a planar region (fig. 1, 24 see also col. 3 lines 43-46) for the benefit of providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition.

22. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine extracting, by the processor, a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines to grow a planar region as shown in Leger with Kanade for the benefit of

providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition.

23. Regarding claim 13, Kanade teaches: The method, wherein in the line fitting step, there is extracted a group of distance data points estimated to be in one plane on the basis of the distance between the distance data points, and it is re-estimated, based on the distribution of the distance data points in the distance data point group, whether the distance data point group exists in one plane (fig. 14, 90 see also [0089]).

24. Regarding claim 14, Kanade teaches: The method, wherein in the line fitting step, there are extracted lines from a group of distance data points estimated to be in the one plane, takes, as a point of interest, a distance data point whose distance to the lines is largest in the group of distance data points, it is judged, when the distance is smaller than a predetermined threshold, whether the distance data points in the distance data point group are unevenly distributed, and the distance data point group is segmented by the point of interest when the distribution is uneven (fig. 9, 90 see also [0072]).

25. Regarding claim 15, Kanade teaches: The method, wherein in the line fitting step, there is extracted a first line from the group of distance data points estimated to lie in the one plane, a distance data point in the group, whose distance from the first line is longest, is taken as a point of interest, there is extracted a second line from the distance data point group when the distance is smaller than a predetermined threshold, it is judged whether a larger number of distance data points than a predetermined number exist continuously at one side of the second line, and the distance data point group is segmented by the point of interest when the larger number of distance data points than the predetermined number exist continuously (fig. 11, see also [0072]).

26. Regarding claim 16, Leger further teaches: The method, wherein in the planar region growing step, there are selected more than one line estimated to be in one plane and a reference plane is calculated, there are searched lines estimated to be in the plane in which the reference plane lies as grouping lines from the group of lines, the reference plane with the grouping lines is updated and the grouping of the region of the reference plane is repeated, and the updated plane is outputted as an updated one (col. 5 lines 10-14).

27. Regarding claim 17, Leger further teaches: The method, further comprising a plane recalculating step of recalculating, by the processor, a plane from the group of distance data points except for ones whose distance from the updated plane is larger than a predetermined threshold, if any, existing in the distance data point group in the updated plane (col. 5 lines 14-19).

28. Regarding claim 18, Leger further teaches: The method, wherein in the planar region growing step, it is estimated, based on a difference between a lines-determined plane and reference plane, whether the lines lie coplanar with the reference plane (col. 6 lines 21-25).

29. Regarding claim 19, Kanade teaches: An autonomous locomotion robot apparatus, comprising: a distance measuring means for acquiring three-dimensional distance data (fig. 5, 812 see also [0069]); a plane detection apparatus for detecting a plane from the three-dimensional distance data (fig. 5, 810 see also [0067]); and a motion controlling means for controlling the motion of the apparatus on the basis of the result of plane detection by the plane detection apparatus (fig. 3, 60 see also [0057]), the plane detection apparatus including: a line fitting means for fitting a line to each group of distance data points estimated to be in one plane in a three-dimensional space (figs. 16-18 see also [0083] [0084]); the line fitting means fitting

lines using a changeable threshold adapted to distribution of distance data points and noises included in the group of distance data points (fig. 12, see also [0069] [0071] [0072] [0074]).

30. Kanade doesn't teach: a planar region growing means for extracting a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines.

31. The analogous prior art Leger teaches: a planar region growing means for extracting a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines (fig. 1, 24 see also col. 3 lines 43-46) for the benefit of providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition.

32. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine a planar region growing means for extracting a plurality of lines estimated to be in one plane from a group of lines extracted by the line fitting means to calculate a plane from the plurality of lines as shown in Leger with Kanade for the benefit of providing a method of extracting planar features from three-dimensional image data in a noisy environment, such as a platform which moves during data acquisition.

33. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kanade et al. Pub. No.: US 2005/0135680 A1 in view of Leger Patent No.: 5,978,504 further in view of Mitaka et al. Patent No.: 5,546,476.

34. Regarding claim 5, the previous combination of Kanade and Leger remains as above but doesn't teach: The apparatus, wherein the line fitting means segments the distance data point

group when the standard deviation of the distance data point group from which the first line has been determined is larger than a predetermined threshold.

35. The analogous prior art Mitaka teaches: The apparatus, wherein the line fitting means segments the distance data point group when the standard deviation of the distance data point group from which the first line has been determined is larger than a predetermined threshold (fig. 2 see also col. 14 lines 10-20) for the benefit of providing a shape recognition process in which the collation can be performed without changing the shape model even in an event where inputs of the objective shape are successively provided over time and the objective shape involves a significant fluctuation in respective objects (col. 2 lines 1-9).

36. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the apparatus, wherein the line fitting means segments the distance data point group when the standard deviation of the distance data point group from which the first line has been determined is larger than a predetermined threshold as shown in Mitaka with the previous combination for the benefit of providing a shape recognition process in which the collation can be performed without changing the shape model even in an event where inputs of the objective shape are successively provided over time and the objective shape involves a significant fluctuation in respective objects.

37. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanade et al. Pub. No.: US 2005/0135680 A1 in view of Leger Patent No.: 5,978,504 further in view of Lewis Pub. No.: US 2004/0138780 A1.

38. Regarding claim 20, the previous combination of Kanade and Leger remains as above but doesn't teach: The apparatus, further comprising a texture imparting means for imparting a texture to an object.

39. The analogous prior art Lewis teaches: The apparatus, further comprising a texture imparting means for imparting a texture to an object (fig. 10, 49 see also [0066]) for the benefit of to provide a robot that has the ability to detect non-geometric stimuli, such as color, texture, or other surface attributes and determine the utility functions resulting from such stimuli [0018].

40. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the apparatus, further comprising a texture imparting means for imparting a texture to an object as shown in Lewis with the previous combination for the benefit of to provide a robot that has the ability to detect non-geometric stimuli, such as color, texture, or other surface attributes and determine the utility functions resulting from such stimuli.

41. Regarding claim 21, Lewis further teaches: The apparatus, wherein the texture imparting means projects a texture to the object when acquiring the three-dimensional distance data (fig. 10, 47 see also [0066]).

Conclusion

42. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAURICE MCDOWELL, JR whose telephone number is (571)270-3707. The examiner can normally be reached on Mon-Friday 7:30am - 5:00pm Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on 571--272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MM

/XIAO M. WU/

Supervisory Patent Examiner, Art Unit 2628